

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re application of:	KUKULKA ET AL.	:	Confirmation No.:	8247
		:		
Application No.:	10/614,310	:	Group Art Unit:	1753
		:		
Filed:	July 7, 2003	:	Examiner:	Thanh-Truc Trinh
		:		

For: SOLAR CELL STRUCTURE WITH SOLAR CELLS HAVING REVERSE-BIAS  
PROTECTION USING AN IMPLANTED CURRENT SHUNT

**APPEAL BRIEF (REVISED)**

**MAIL STOP APPEAL BRIEF-PATENTS**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Applicant files this revised Appeal Brief in response to the Notice of Non-Compliant Appeal Brief mailed March 17, 2008. The requisite fee was previously filed. Applicant corrects the typographical error in the Status of the Claims section that inadvertently referred to the final rejection of claims 1-7 and 16-21, instead of properly referring to claims 1-7 and 16-20. As the Status of Claims section otherwise correctly refers to claims 1-20 as pending, and claims 1-7 and 16-20 as finally rejected, this error is considered de minimis.

**REAL PARTY IN INTEREST**

The real party in interest is The Boeing Company, Seattle, Washington.

**RELATED APPEALS AND INTERFERENCES**

Appellants are not aware of any related appeals and/or interferences.

### STATUS OF CLAIMS

Claims 1-15 were originally filed. During prosecution, the Examiner required a restriction between Group I, claims 1-7 and Group II, claims 8-15. The Appellants orally elected Group I, claims 1-7. During prosecution, no claims were amended, and claims 16-20 were added. Appellants traversed and then petitioned the restriction requirement, and a Decision on the Petition for withdrawal of the restriction was granted.

Claims 1-20 are pending, claims 8-15 currently stand withdrawn, and claims 1-7 and 16-20 are finally rejected. Appellants appeal from the final rejection of claims 1-7 and 16-20 of the Final Office Action mailed June 5, 2007 and the Advisory Action of September 10, 2007, (hereinafter "Final Office Action" and "Advisory Action" respectively).

The appealed claims are set forth in Appendix I.

### STATUS OF AMENDMENTS

No amendments to the claims were made.

### SUMMARY OF CLAIMED SUBJECT MATTER

Claims 1 and 17 are independent; no means plus function claims are present in the application. Claim 17 is a different embodiment of generic claim 1. The following summary is provided with reference to the page and line number and/or Figures of the substitute specification submitted with the Application as originally filed.

Claim 1 is directed to a solar cell structure (Figure 1, page 4, lines 25-27) comprising an electrically interconnected array of individual solar cells. The solar cells (Figure 4, page 5, line 15 to page 6, line 6) comprise two semiconductor layers in facing contact with each other, wherein the semiconductor layers comprise a semiconductor junction producing a voltage between the two semiconductor layers when illuminated, a shunt comprising a channel of an altered material extending between and at least partially through the two semiconductor layers, and having an asymmetric current-voltage characteristic of passing a small current when voltage-

biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction.

Claim 17 is directed to a solar cell structure similar to claim 1, but which further defines the individual solar cells. The solar cells (Figure 4, page 5, line 15 to page 6, line 19, and page 7, lines 5-9) comprise two semiconductor layers in facing contact with each other, wherein the semiconductor layers comprise a semiconductor junction producing a voltage between the two semiconductor layers when illuminated, a front side metal grid, a back side metallization, and a shunt comprising a channel of a proton-irradiated altered material (page 7, lines 5-9) or a doped altered material (page 6, lines 17-19), extending between and at least partially through the two semiconductor layers, and having an asymmetric current-voltage characteristic of passing a small current when voltage-biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction.

Claims 2-7 are dependent on claim 1. Claim 2 is directed to wherein the altered material is a proton-irradiating material (Figure 4, page 7, lines 5-9). Claim 3 is directed to wherein the altered material is a doped altered material (Figure 4, page 6, lines 17-19). Claim 4 is directed to wherein the solar cell comprises more than two semiconductor layers (Figure 4, page 5, lines 15-23), and wherein the shunt extends between and at least partially through at least two of the semiconductor layers (Figure 4, page 5, lines 29-31). Claim 5 is directed to wherein the solar cell comprises more than two semiconductor layers (Figure 4, page 5, lines 15-23), and wherein the shunt extends between at least partially through at least three of the semiconductor layers (Figure 4, page 5, lines 29-31). Claim 6 is directed to wherein the shunt comprises a plurality of channels spaced apart from each other over a front-side surface of the solar cell (Figure 4, page 5, line 29 to page 6, line 12). Claim 7 is directed to wherein the solar cell structure comprises a plurality of electrically interconnected solar cells as recited in claim 1, with each solar cell having a shunt as recited in claim 1 (Figure 1, page 4, lines 25-27, and Figure 4, page 5, lines 29-31).

Claims 18-20 are dependent on claim 17. Claim 18 is directed to wherein the solar cell comprises more than two semiconductor layers (Figure 4, page 5, lines 15-23), and wherein the shunt extends between and at least partially through at least two of the semiconductor layers (Figure 4, page 5, lines 29-31). Claim 19 is directed to wherein the shunt comprises a plurality of channels spaced apart from each other over a front-side surface of the solar cell (Figure 4, page 5, line 29 to page 6, line 12). Claim 20 is directed to wherein the solar cell structure comprises a plurality of electrically interconnected solar cells as recited in claim 17, with each solar cell having a shunt as recited in claim 17 (Figure 1, page 4, lines 25-27, and Figure 4, page 5, line 15 to page 6, line 19, and page 7, lines 5-9).

#### GROUND OF REJECTION TO BE REVIEWED ON APPEAL

**Ground 1.** Claims 1, 3-6, and 16-19 are rejected under 35 U.S.C. §102(b) as anticipated by Kressel et al. (U.S. Patent 4,070,206, hereinafter referred to as "Kressel").

**Ground 2.** Claim 2 is rejected under 35 U.S.C. §103 as unpatentable over Kressel in view of Merritt et al. (U.S. Patent 4,926,083, hereinafter referred to as "Merritt").

**Ground 3.** Claims 7 and 20 are rejected under 35 U.S.C. §103 over Kressel in view of Solar Panels website.

#### ARGUMENT

Claims 1, 3-6, and 16-19 are rejected under 35 U.S.C. §102(b). The following principle of law applies to §102 rejections. MPEP 2131 provides: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the ... claim. The elements must be arranged as required by the claim..." [citations omitted] This is in accord with the decisions of the courts. Anticipation under §102 requires 'the presence in a single prior art disclosure of all elements of a claimed invention arranged as in

that claim.’ Carella v. Starlight Archery, 231 USPQ 644, 646 (Fed. Cir., 1986), quoting Panduit Corporation v. Dennison Manufacturing Corp., 227 USPQ 337, 350 (Fed. Cir., 1985).

Thus, identifying a single element of the claim, which is not disclosed in the reference is sufficient to overcome a §102 rejection.

## **Ground 1**

### Claims 1, 3-6, and 16-19

Claim 1 recites in part:

“a shunt...

having an asymmetric current-voltage characteristic of passing a small current when voltage-biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction.”

Kressel admittedly does not disclose this limitation.

The explanation of the rejection seeks to negate this limitation with reference to case authority dealing with newly discovered use or function being “inherent in the prior art.” The Examiner’s position can be sustained only if it can be shown that the recited limitation is inherent in the approach of Kressel.

MPEP 2112-2113 sets forth the law on inherency. Inherency is not to be taken lightly and not to be asserted unless there is good evidence to suggest that the asserted property or characteristic is necessarily present in the teachings of the prior art reference. The concept of inherency is not provided as a way to fill in the gaps in missing disclosure or teachings based upon speculation, unless the asserted property or characteristic may be shown to be necessarily present by objective evidence. Instead, “inherency” is used when every aspect of the disclosure of a reference and the claimed subject matter is otherwise exactly the same, then it may be inferred that some property or characteristic further recited in the claim must necessarily be present in the art reference. MPEP 2112 provides “The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). “To establish inherency, the

extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.’” In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted). “In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).”

The Examiner’s response is twofold.

First, the Examiner argues that the recited limitation is “inherent,” without providing any reasoning supporting this statement (Final Office Action, page 8, lines 9-14). Kressel does not disclose the claimed asymmetric characteristic anywhere, nor has the Examiner provided any pertinent argument that there would necessarily be any asymmetry in the voltage characteristics of Kressel. No location in Kressel or any other source is identified that might have such a disclosure or lead to such a conclusion. Additionally, Appellants fail to understand how the Examiner is applying an inherency argument to provide structure, not just function, to the claim.

Second, the Examiner argues that “Applicant does not show any evidence to prove the prior art products do not necessarily possess the characteristics of the claimed product.” (Final Office Action, page 8, lines 14-16.) The Examiner has misperceived the instructions of MPEP 2112. It is the Examiner who must make the showing of inherency. MPEP 2112 provides: “In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” [emphasis added]

In effect, the Examiner is attempting to read out the limitation of claim 1, “a shunt...having an asymmetric current-voltage characteristic of passing a small current when voltage-biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction” by arguing inherency without any basis for the argument.

Appellants submit that this limitation is not disclosed by Kressel, and would not be an inherent limitation to Kressel, and therefore claim 1 is allowable.

Claims 3-6 and 16 incorporate these same limitations, and are therefore also allowable.

Claim 17 recites in part:

“a shunt comprising a channel of a proton-irradiated altered material or a doped altered material” [emphasis added]

The explanation of the rejection does not mention the emphasized limitation, and Kressel has no such disclosure.

Claim 17 further recites in part:

“a shunt...

having an asymmetric current-voltage characteristic of passing a small current when voltage-biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction.”

Kressel admittedly does not disclose this limitation.

The explanation of the rejection seeks to negate this limitation with reference to case authority dealing with newly discovered use or function being “inherent in the prior art.” The Examiner’s position can be sustained only if it can be shown that the recited limitation is inherent in the approach of Kressel. Applicant incorporates the discussion of the inherency issue from the discussion of the rejection of claim 1.

Claims 18-19 incorporate these same limitations, and are therefore also allowable.

Appellants submit that Kressel does not disclose the limitations of independent claims 1 and 17, and dependent claims 3-5, 6, 16 and 18-19.

Claims 2, 7 and 20 are rejected based on 35 U.S.C. §103(a). The following principle of law applies to all §103(a) rejections. As stated by the Federal Circuit, “a proper analysis under 35 U.S.C. § 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success.” *In re Vaeck*, 947, F.2d 488, 493 (Fed. Cir. 1991). In addition, the prior

art reference(s) must teach or suggest all of the claim limitations. The teaching or suggestion to combine and the reasonable expectation of success must both be found in the prior art, and not in Applicant's disclosure. *Id* at 493. *See also* MPEP 2142.

The factual inquires set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 IS{Q 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. §103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or Nonobviousness,

## **Ground 2**

### Claim 2

Claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over Kressel in view of Merritt.

Kressel is discussed in Ground 1, above.

As a threshold issue, it is determined that Merritt is nonanalogous art. Stated alternatively, Merritt is not within the scope and content of the prior art that may be used in forming a §103 rejection. Its teachings are therefore not properly combined with the teachings of Kressel. To be analogous art and properly used in forming a §103 rejection, a reference must be concerned with the same problem as another reference and the claims which are being addressed. *See, for example, Medtronic, Inc. v. Cardiac Pacemaker, Inc.*, 220 USPQ 97, 104 (Fed. Cir. 1983), stating: "Faced with a rate-limiting problem, one of ordinary skill in the art would look to the solutions of others faced with rate-limiting problems." In the present case, the inventor was concerned with a problem in solar cells, *see* the Background section of the Specification, the Summary of the Invention, the Detailed Description, and the claims. Merritt has nothing at all to do with solar cells. Merritt deals with acoustic charge transport devices, and therefore is not properly within the scope of the prior art. Further, Merritt does not deal at all with solar cell



shunts and their structure. Merritt does not attempt to modify a channel by proton irradiation, but instead is seeking to modify the surrounding area. It is therefore not properly applied in rejecting the present claims. Merritt cannot be used in combination with Kressel to reject claims dealing with solar cells.

Even if Merritt is improperly applied in an attempt to reject the present claims, no *prima facie* ground of rejection is stated.

MPEP 2142, under ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS, provides: “To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. [citations omitted]. See MPEP para 2143-2143.03 for decisions pertinent to each of these criteria.”

First requirement--there must be an objective basis for combining the teachings of the references.

The first of the requirements of MPEP 2142 is that “there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings.” The present rejection is a §103 combination rejection. To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2142, 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir., 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

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"The PTO has the burden under §103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

"One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

"Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

\* \* \* \* \*

"The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."

\* \* \* \* \*

"A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective

reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).”

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure.

In this case, Kressel and the present invention deal with solar cells. Merritt has absolutely no relation to solar cells.

If the rejection is maintained, Appellants request that the Examiner set forth the objective basis found in the references themselves for combining the teachings of the references or by what knowledge generally available to one of ordinary skill in the art the references are combined, and for adopting only the helpful teachings of each reference and disregarding the unhelpful teachings of the reference. Thus, as it stands now, the invention as a whole is not prima facie obvious over the combined teachings of the prior art.

Second requirement--there must be an expectation of success.

The second of the requirements of MPEP 2142 is an expectation of success. There is no expectation of success...This requirement has not been addressed in the explanation of the rejection, and in any event more than Examiner's argument is required here.

As stated in MPEP 2142, “The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted].”

This requirement has not been addressed in the explanation of the rejection, for good reason. There is no basis to argue that processing of the acoustic charge transport device of Merritt would have any expectation of success with the solar cell of Kressel.

Third requirement--the prior art must teach the claim limitations.

The third of the requirements of MPEP 2142 is that “the prior art reference (or references when combined) must teach or suggest all the claim limitations.” In this regard, the following

principle of law applies to all §103 rejections. MPEP 2143.03 provides “To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).” [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

Kressel does not teach the limitations of claim 1 for the reasons stated above and which are incorporated here. Merritt adds nothing in this regard. Claim 1 and its dependent claim 2 are therefore patentable over this ground of rejection.

The limitations of claim 1 are incorporated into claim 2. Claim 1 recites in part:

“...a shunt comprising a channel of an altered material  
extending between and at least partially through the two  
semiconductor layers,”

Neither reference teaches a shunt made of an altered material that extends between and at least partially through the two semiconductor layers.

Applicant submits that Kressel in view of Merritt does not disclose the limitations of dependent claim 2, and requests that the rejection be reversed.

### **Ground 3**

#### Claims 7 and 20

Claims 7 and 20 are rejected over Kressel in view of Solar Panels website.

Kressel is discussed in Ground 1 above.

The Solar Panels web site download is not properly applied as prior art. The document is not dated, and there is nothing that establishes that the web page was available prior to the filing date of the present application, in the form that it is presented now to Applicant. If this rejection is maintained, Applicant asks that the Examiner provide evidence establishing that this web page was available to the public prior to the filing date of the present application.

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Claim 7 incorporates the limitations of claim 1. The limitations of claim 1 are not taught by the combination of references for the reasons set forth in relation to the Ground 1 rejection, which are incorporated herein. The Solar Panels website adds nothing in this regard.

Claim 20 incorporates the limitations of claim 17. The limitations of claim 17 are not taught by Kressel for the reasons set forth in relation to the Ground 17 rejection, which are incorporated herein. The Solar Panels website adds nothing in this regard.

Applicant submits that Kressel in view of Solar Panels website does not disclose the limitations of dependent claims 7 and 20, and requests that the rejection be reversed.

#### SUMMARY AND CONCLUSION

Applicant asks that the Board reverse the rejections.

The Commissioner is authorized to charge any fees determined to be due to the undersigned's Account No. 50-1059.

Respectfully submitted,

Dated: March 31, 2008

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APPENDIX I

Copy of Claims Involved in the Appeal

1. A solar cell structure comprising:  
a solar cell comprising two semiconductor layers in facing contact with each other, wherein the semiconductor layers comprise a semiconductor junction producing a voltage between the two semiconductor layers when illuminated; and  
a shunt comprising a channel of an altered material  
extending between and at least partially through the two semiconductor layers, and  
having an asymmetric current-voltage characteristic of passing a small current when voltage-biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction.
2. The solar cell structure of claim 1, wherein the altered material is a proton-irradiated altered material.
3. The solar cell structure of claim 1, wherein the altered material is a doped altered material.
4. The solar cell structure of claim 1, wherein the solar cell comprises more than two semiconductor layers, and wherein the shunt extends between and at least partially through at least two of the semiconductor layers.
5. The solar cell structure of claim 1, wherein the solar cell comprises more than two semiconductor layers, and wherein the shunt extends between and at least partially through at least three of the semiconductor layers.
6. The solar cell structure of claim 1, wherein the shunt comprises a plurality of channels spaced apart from each other over a front-side surface of the solar cell.

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7. The solar cell structure of claim 1, wherein the solar cell structure comprises a plurality of electrically interconnected solar cells as recited in claim 1, with each solar cell having a shunt as recited in claim 1.
16. The solar cell structure of claim 1, wherein the solar cell further comprises:
  - a front side metal grid, and
  - a back side metallization.
17. A solar cell structure comprising:
  - a solar cell comprising
    - two semiconductor layers in facing contact with each other, wherein the semiconductor layers comprise a semiconductor junction producing a voltage between the two semiconductor layers when illuminated,
    - a front side metal grid, and
    - a back side metallization; and
    - a shunt comprising a channel of a proton-irradiated altered material or a doped altered material,
      - extending between and at least partially through the two semiconductor layers, and
      - having an asymmetric current-voltage characteristic of passing a small current when voltage-biased in a forward direction parallel to the channel, and passing a large current when voltage-biased in a reverse direction parallel to the channel and opposite to the forward direction.
18. The solar cell structure of claim 17, wherein the solar cell comprises more than two semiconductor layers, and wherein the shunt extends between and at least partially through at least two of the semiconductor layers.
19. The solar cell structure of claim 17, wherein the shunt comprises a plurality of channels spaced apart from each other over a front-side surface of the solar cell.
20. The solar cell structure of claim 17, wherein the solar cell structure comprises a plurality of electrically interconnected solar cells as recited in claim 17, with each solar cell having a shunt as recited in claim 17.

APPENDIX II

Evidence Entered and Relied Upon in the Appeal

None.



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### APPENDIX III

#### Related Proceedings

Appellants are not aware of any related proceedings.